

REGISTRO DE ENSAYOS DE PERMEABILIDAD
MINERA PANAMA
FACILIDADES DE GESTION DE RELAVES
MAYO 2022 - OCTUBRE 2022

MAYO 2022

Sample Identification		 FIRST QUANTUM MINERALS LTD. Cobre Panamá	
1	Informacion General (Informacion General)		
	Sample number (Numero de muestra):	MPSA-RT-DRI-065	
	sampled date (Fecha de muestreo):	14-May-22	
2	Material Information (Informacion del Material)		
	Source (Fuente)	Sand Cycloning Plant	
	Work Area (Area de Trabajo)	TMF ED CELL-28.(in place)	
	Borrow - Foundation - Excavation - Crusher - Fill - Site Investigation - Other: Plant Prestamo - Fundacion - Excavacion - Crusher - Relleno - Investigacion de Sitio - Otro:		
	Fill Zone (specs 1824-363-CI-SPC-0003): Zona de Material:		
	Material Type Tipo de Material	Tailings Material	Quality Test
	Remarks: Comentarios:		
	Test Doble Ring, Sand Cone and Permeability		
		Start sta.:	End Sta.:
	Coordinates - GPS or Survey (Coordenadas - GPS o Topografia):	N: 981228	E: 538739
	Depth used to estimate elevation: (Profundidad a la que se tomo la muestra):	150 mm	
	Recorded Ground elevation: (Elevacion del terreno)	86.30m	
Technician:	Name: YG/FM	Signature:	
Lab Supervisor:	Name: CG	Signature:	

Project Identification:		MPSA Cobre TMF				Constants	Area cm2	Depth of Liquid (cm)	Liquid Container Number		Marriotte Tube Volume			Marriotte Tube Area		
Test Location:		TMF ED CELL-28.(in place)				Inner Ring	729	15.0			3000			54		
Liquid Used:		H ₂ O	pH:	N/A		Annular Space	2189	15.0			10000			167		
Tested By:		Y. GuerrA / F. Miranda				Liquid level maintained using:		() Flow Valve () Float Valve (X) Mariotte Tubes								
Fines %:		8.6				Penetration Depth of Outer Ring: 15cm										
Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/(Total) Min	Flow Readings				Liquid Temp C	Infiltration Rate				Ground Temperature		Remarks
					Inner Ring Reading cm	Inner Marriotte Tube Flow (ml)	Annular Space Reading cm	Annular Space Marriotte Tube Flow (ml)		Inner Infiltration Rate cm/h	Inner Infiltration Rate cm/s	Annular Infiltration Rate cm/h	Annular Infiltration Rate cm/s	Ground Temp Depth (cm)	Temp at Depth (c)	Weather Conditions Etc...
1	Start Test	05/14/22	0:00:00		58.8		58.0		30.5							Annular Ring H ₂ O Depth Initial: 15cm
	End Test	05/14/22	0:00:30	0:00:30	58.5	16	57.5	84	30.5	2.659	7.386E-04	4.589	1.275E-03	25.0	25.5	Inner Ring H ₂ O Depth Initial: 15cm
2	Start Test	05/14/22	0:00:30	0:00:30	58.5		57.8		30.5							
	End Test	05/14/22	0:01:00	0:01:00	58.2	16	57.0	134	30.5	2.659	7.386E-04	7.342	2.039E-03			
3	Start Test	05/14/22	0:01:00	0:00:30	58.2		57.0		30.5							Annular Ring H ₂ O Depth Final: 3.0cm
	End Test	05/14/22	0:01:30	0:01:30	57.1	59	56.4	100	30.5	9.750	2.708E-03	5.507	1.530E-03			Inner Ring H ₂ O Depth Final: 1.0cm
4	Start Test	05/14/22	0:01:30	0:00:30	57.1		56.4		30.5							
	End Test	05/14/22	0:02:00	0:02:00	55.8	70	55.5	151	30.5	11.523	3.201E-03	8.260	2.294E-03			
5	Start Test	05/14/22	0:02:00	0:00:30	55.8		55.5		30.5							
	End Test	05/14/22	0:02:30	0:02:30	54.4	75	54.7	134	30.5	12.409	3.447E-03	7.342	2.039E-03			Weather conditions: Sunny hot day
6	Start Test	05/14/22	0:02:30	0:00:30	54.4		54.7		30.5							
	End Test	05/14/22	0:03:00	0:03:00	52.9	81	53.8	151	30.5	13.295	3.693E-03	8.260	2.294E-03			Weather Temp: 30.5°C
7	Start Test	05/14/22	0:03:00	0:00:30	52.9		53.8		30.5							
	End Test	05/14/22	0:03:30	0:03:30	51.4	81	52.9	151	30.5	13.295	3.693E-03	8.260	2.294E-03			
8	Start Test	05/14/22	0:03:30	0:00:30	51.4		52.9		30.5							Nuclear Density Test
	End Test	05/14/22	0:04:00	0:04:00	49.8	86	52.0	151	30.5	14.182	3.939E-03	8.260	2.294E-03			
9	Start Test	05/14/22	0:04:00	0:00:30	49.8		52.0		30.5							W.D: 1874 kg/m3
	End Test	05/14/22	0:04:30	0:04:30	48.2	86	51.0	167	30.5	14.182	3.939E-03	9.178	2.549E-03			
10	Start Test	05/14/22	0:04:30	0:00:30	48.2		51.0		30.5							D.D: 1732 kg/m3
	End Test	05/14/22	0:05:00	0:05:00	46.6	86	50.0	167	30.5	14.182	3.939E-03	9.178	2.549E-03			
11	Start Test	05/14/22	0:05:00	0:00:30	46.6		50.0		30.5							M.C: 8.2 %
	End Test	05/14/22	0:05:30	0:05:30	45.0	86	49.1	151	30.5	14.182	3.939E-03	8.260	2.294E-03			
12	Start Test	05/14/22	0:05:30	0:00:30	45.0		49.1		30.5							Compaction: 108.4%
	End Test	05/14/22	0:06:00	0:06:00	43.3	92	48.1	167	30.5	15.068	4.186E-03	9.178	2.549E-03			
13	Start Test	05/14/22	0:06:00	0:00:30	43.3		48.1		30.5							(Using MPSA-RT-27026 Standard Lab. Compaction M.D.D: 1597, O.M.C: 19.5%) Mechanical Sand
	End Test	05/14/22	0:06:30	0:06:30	41.6	92	47.1	167	30.5	15.068	4.186E-03	9.178	2.549E-03			
14	Start Test	05/14/22	0:06:30	0:00:30	41.6		47.1		30.5							
	End Test	05/14/22	0:07:00	0:07:00	39.9	92	46.0	184	30.5	15.068	4.186E-03	10.095	2.804E-03			
15	Start Test	05/14/22	0:07:00	0:00:30	39.9		46.0		30.5							
	End Test	05/14/22	0:07:30	0:07:30	38.1	97	45.0	167	30.5	15.954	4.432E-03	9.178	2.549E-03			
16	Start Test	05/14/22	0:07:30	0:00:30	38.1		45.0		30.5							
	End Test	05/14/22	0:08:00	0:08:00	36.5	86	43.9	184	30.5	14.182	3.939E-03	10.095	2.804E-03			
17	Start Test	05/14/22	0:08:00	0:00:30	36.5		43.9		30.5							
	End Test	05/14/22	0:08:30	0:08:30	34.7	97	42.9	167	30.5	15.954	4.432E-03	9.178	2.549E-03			
18	Start Test	05/14/22	0:08:30	0:00:30	34.7		42.9		30.5							
	End Test	05/14/22	0:09:00	0:09:00	33.0	92	41.8	184	30.5	15.068	4.186E-03	10.095	2.804E-03			
19	Start Test	05/14/22	0:09:00	0:00:30	33.0		41.8		30.5							
	End Test	05/14/22	0:09:30	0:09:30	31.2	97	40.7	184	30.5	15.954	4.432E-03	10.095	2.804E-03			
20	Start Test	05/14/22	0:09:30	0:00:30	31.2		40.7		30.5							
	End Test	05/14/22	0:10:00	0:10:00	29.6	86	39.6	184	30.5	14.182	3.939E-03	10.095	2.804E-03			
21	Start Test	05/14/22	0:10:00	0:00:30	29.6		39.6		30.5							
	End Test	05/14/22	0:10:30	0:10:30	27.7	102	38.5	184	30.5	16.841	4.678E-03	10.095	2.804E-03			

MINA COBRE PANAMA
Gradation Analysis (ASTM D6913)



FIRST QUANTUM
MINERALS LTD.

Cobre Panamá

Location:

TMF ED CELL-28.(in place)

Other:

Test Doble Ring, Sand Cone and
Permeability

Sample Type:

Tailings Material

Technician:

JS

Sample No:

MPSA-RT-DRI-065

Date Tested:

14-May-22

Source:

Sand Cycloning Plant

14-May-22

Wet Weight (g):

538.96

Moisture (%):

8.4

Orig. Dry Wt. (g):

496.99

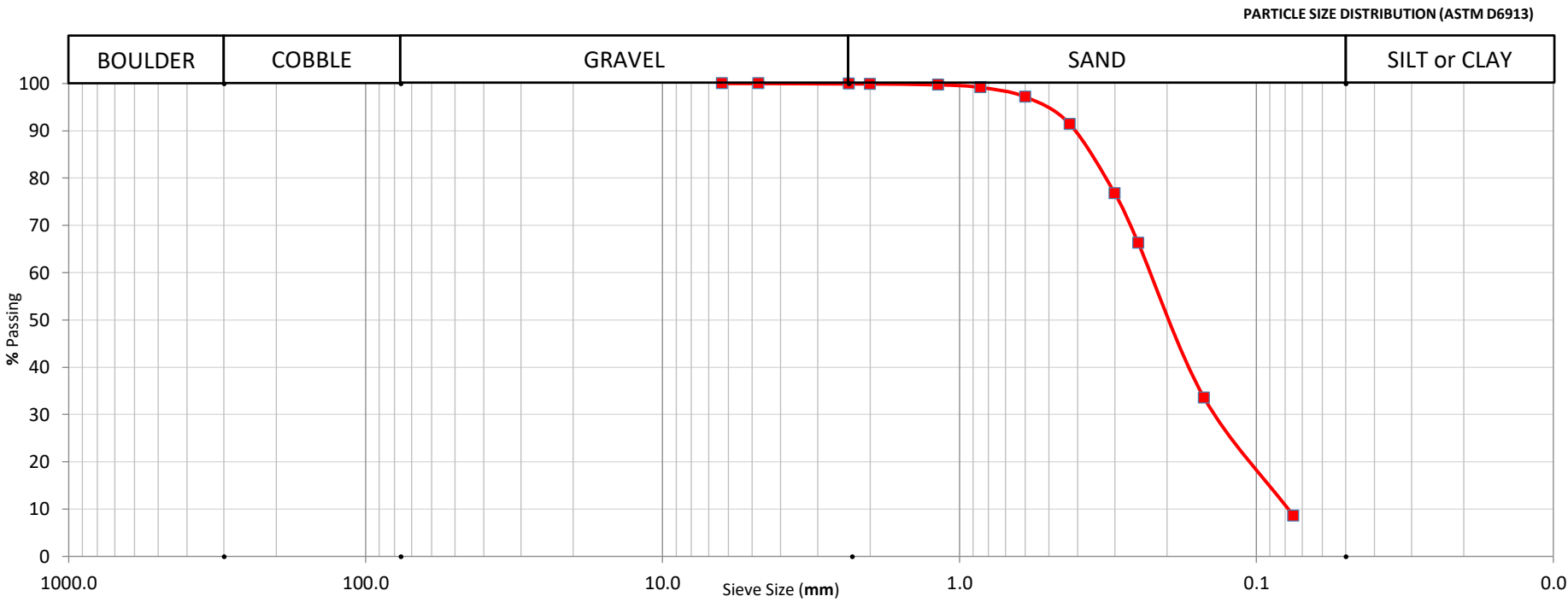
Total Solid (%):

Washed Oven Dry Wt. (g):

Washed Loss (g):

Specific Gravity :

Gravel	0.0
Sand	91.4
Fines	8.6
Fineness modulus	2.28



Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
24"	600.0						
18"	450.0						
12"	300.0						
8"	200.0						
6"	150.0						
5"	125.0						
4"	100.0						
3"	75.0						
2 1/2"	63.0						
2"	50.0						
1.5"	37.5						
1"	25.0						
3/4"	19.0						
1/2"	12.5						
3/8"	9.5						
1/4"	6.3			0.00	0.00	0.0	100.0

Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
#4	4.75			0.00	0.00	0.0	100.0
#8	2.36			0.42	0.42	0.1	99.9
#10	2.00			0.05	0.47	0.1	99.9
#16	1.18			0.88	1.35	0.3	99.7
#20	0.85			2.81	4.16	0.8	99.2
#30	0.60			9.91	14.07	2.8	97.2
#40	0.425			28.65	42.72	8.6	91.4
#50	0.30			72.67	115.39	23.2	76.8
#60	0.25			52.28	167.67	33.7	66.3
#100	0.15			162.60	330.27	66.5	33.5
#200	0.075			124.16	454.43	91.4	8.6

JUNIO 2022

Sample Identification		 FIRST QUANTUM MINERALS LTD. Cobre Panamá	
	Informacion General (Informacion General)		
	Sample number (Numero de muestra):	MPSA-RT-DRI-087	
	sampled date (Fecha de muestreo):	3-Jun-22	
	Material Information (Informacion del Material)		
	Source (Fuente)	TMF Sand Cyclone Plant	
	Work Area (Area de Trabajo)	TMF ND4 Sand Cell N°27 Platform (in place).	
	Borrow - Foundation - Excavation - Crusher - Fill - Site Investigation - Other: Plant <i>Prestamo - Fundacion - Excavacion - Crusher - Relleño - Investigacion de Sitio - Otro:</i>		
	Fill Zone (specs 1824-363-CI-SPC-0003): Zona de Material:		
	Material Type Tipo de Material	Hydraulic Sand	Quality Test For DRI Infiltrometer Test
	Remarks: Comentarios:		
	Doble Ring Test, Sand Cone and Permeability Test		
		Start sta.:	End Sta.:
	Coordinates - GPS or Survey (Coordenadas - GPS o Topografia):	N: 982881	E: 535753
	Depth used to estimate elevation: (Profundidad a la que se tomo la muestra):	150 mm	
	Recorded Ground elevation: (Elevacion del terreno)	Elev. 90.61m	
Technician:	Name: MG/RH	Signature:	
Lab Supervisor:	Name: CG	Signature:	

MINA COBRE PANAMA
Gradation Analysis (ASTM D6913)



FIRST QUANTUM
MINERALS LTD.

Cobre Panamá

Sample Type: Hydraulic Sand

Technician: EG

Location: TMF ND4 Sand Cell N°27 Platform (in place).

Sample No: MPSA-RT-DRI-087

Date Tested: 3-Sep-22

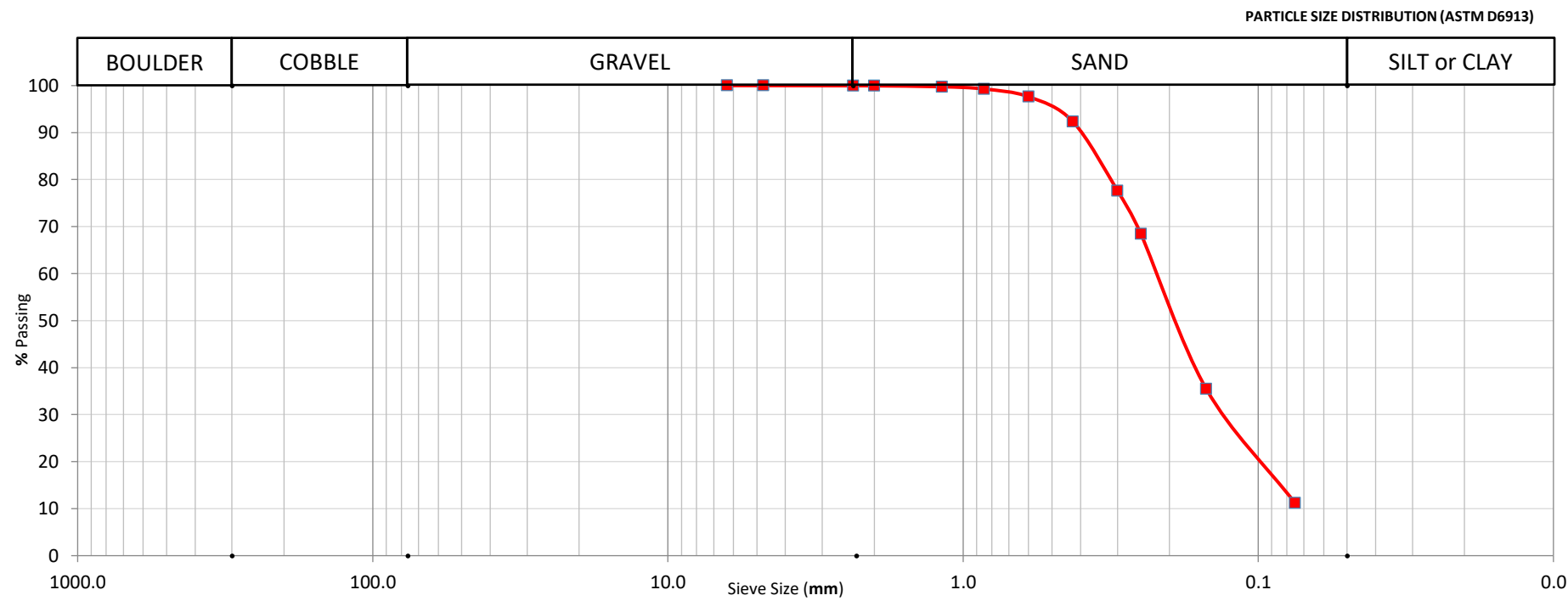
Other: Doble Ring Test, Sand Cone and Permeability Test

Source: TMF Sand Cyclone Plant

3-Jun-22

Wet Weight (g):	393.66
Moisture (%):	12.9
Orig. Dry Wt. (g):	348.66
Total Solid (%):	
Washed Oven Dry Wt. (g):	309.70
Washed Loss (g):	38.96
Specific Gravity :	

Gravel	0.0
Sand	88.8
Fines	11.2
Fineness modulus	2.18



Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
24"	600.0						
18"	450.0						
12"	300.0						
8"	200.0						
6"	150.0						
5"	125.0						
4"	100.0						
3"	75.0						
2 1/2"	63.0						
2"	50.0						
1.5"	37.5						
1"	25.0						
3/4"	19.0						
1/2"	12.5						
3/8"	9.5						
1/4"	6.3			0.00	0.00	0.0	100.0

Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
#4	4.75			0.00	0.00	0.0	100.0
#8	2.36			0.11	0.11	0.0	100.0
#10	2.00			0.05	0.16	0.0	100.0
#16	1.18			0.70	0.86	0.2	99.8
#20	0.85			1.66	2.52	0.7	99.3
#30	0.60			5.73	8.25	2.4	97.6
#40	0.425			18.41	26.66	7.6	92.4
#50	0.30			51.29	77.95	22.4	77.6
#60	0.25			32.00	109.95	31.5	68.5
#100	0.15			115.08	225.03	64.5	35.5
#200	0.075			84.67	309.70	88.8	11.2

Project Identification:				MPSA Cobre TMF				Constants		Area cm2		Depth of Liquid (cm)		Liquid Container Number		Marriotte Tube Volume		Marriotte Tube Area	
Test Location:				TMF ND4 Sand Cell N#27 Platform (in place).				Inner Ring		729		15.0				3000		54	
Liquid Used:				H ₂ O		pH:		N/A		Annular Space		2189		15.0				10000 167	
Tested By:				Margarito.G/Reinaldo.H				Liquid level maintained using:		() Flow Valve () Float Valve (X) Mariotte Tubes									
Fines %:				11.2%				Penetration Depth of Outer Ring: 15cm											
Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/(Total) Min	Flow Readings				Liquid Temp C	Infiltration Rate				Ground Temperature		Remarks			
					Inner Ring Reading cm	Inner Marriotte Tube Flow (ml)	Annular Space Reading cm	Annular Space Marriotte Tube Flow (ml)		Inner Infiltration Rate cm/h	Inner Infiltration Rate cm/s	Annular Infiltration Rate cm/h	Annular Infiltration Rate cm/s	Ground Temp Depth (cm)	Temp at Depth (c)		Weather Conditions Etc...		
1	Start Test	26/8/2022	0:00:00				57.0											Annular Ring H ₂ O Depth Initial: 15cm Inner Ring H ₂ O Depth Initial: 15cm	
	End Test	26/8/2022	0:00:30	0:00:30		54	57.7 56.0	318	31.0 31.0	8.863	2.462E-03	17.438	4.844E-03	31.2	29.9				
2	Start Test	26/8/2022	0:00:30	0:00:30			56.0												
	End Test	26/8/2022	0:01:00	0:01:00		108	54.1 54.0	285	31.0 31.0	17.727	4.924E-03	15.602	4.334E-03						
3	Start Test	26/8/2022	0:01:00	0:00:30			54.0											Annular Ring H ₂ O Depth Final: 2.0cm Inner Ring H ₂ O Depth Final: 2.0cm	
	End Test	26/8/2022	0:01:30	0:01:30		113	51.9 51.9	117	31.0 31.0	18.613	5.170E-03	6.424	1.785E-03						
4	Start Test	26/8/2022	0:01:30	0:00:30			51.9												
	End Test	26/8/2022	0:02:00	0:02:00		129	49.5 49.5	134	31.0 31.0	21.272	5.909E-03	7.342	2.039E-03						
5	Start Test	26/8/2022	0:02:00	0:00:30			49.5											Weather conditions: Sunny Hot Day	
	End Test	26/8/2022	0:02:30	0:02:30		113	47.4 47.4	151	31.0 31.0	18.613	5.170E-03	8.260	2.294E-03						
6	Start Test	26/8/2022	0:02:30	0:00:30			47.4											Weather Temp: 31.2°C	
	End Test	26/8/2022	0:03:00	0:03:00		113	45.3 45.3	184	31.0 31.0	18.613	5.170E-03	10.095	2.804E-03						
7	Start Test	26/8/2022	0:03:00	0:00:30			45.3												
	End Test	26/8/2022	0:03:30	0:03:30		102	43.4 43.4	167	31.0 31.0	16.841	4.678E-03	9.178	2.549E-03						
8	Start Test	26/8/2022	0:03:30	0:00:30			43.4											Nuclear Density Test	
	End Test	26/8/2022	0:04:00	0:04:00		92	41.7 41.7	184	31.0 31.0	15.068	4.186E-03	10.095	2.804E-03						
9	Start Test	26/8/2022	0:04:00	0:00:30			41.7											W.D: 1865 kg/m3	
	End Test	26/8/2022	0:04:30	0:04:30		92	40.0 40.0	167	31.0 31.0	15.068	4.186E-03	9.178	2.549E-03						
10	Start Test	26/8/2022	0:04:30	0:00:30			40.0											D.D: 1730 kg/m3	
	End Test	26/8/2022	0:05:00	0:05:00		86	38.4 38.4	184	31.0 31.0	14.182	3.939E-03	10.095	2.804E-03						
11	Start Test	26/8/2022	0:05:00	0:00:30			38.4											M.C: 7.8%	
	End Test	26/8/2022	0:05:30	0:05:30		86	36.8 36.8	184	31.0 31.0	14.182	3.939E-03	10.095	2.804E-03						
12	Start Test	26/8/2022	0:05:30	0:00:30			36.8											Compaction: 107.3 %	
	End Test	26/8/2022	0:06:00	0:06:00		81	35.3 35.3	184	31.0 31.0	13.295	3.693E-03	10.095	2.804E-03						
13	Start Test	26/8/2022	0:06:00	0:00:30			35.3											(Using MPSA-RT-33403 Standard Lab. Compaction M.D.D: 1612 O.M.C: 17.3%) Hydraulic Sand	
	End Test	26/8/2022	0:06:30	0:06:30		81	33.8 33.8	167	31.0 31.0	13.295	3.693E-03	9.178	2.549E-03						
14	Start Test	26/8/2022	0:06:30	0:00:30			33.8												
	End Test	26/8/2022	0:07:00	0:07:00		75	32.4 32.4	184	31.0 31.0	12.409	3.447E-03	10.095	2.804E-03						
15	Start Test	26/8/2022	0:07:00	0:00:30			32.4												
	End Test	26/8/2022	0:07:30	0:07:30		75	31.0 31.0	184	31.0 31.0	12.409	3.447E-03	10.095	2.804E-03						
16	Start Test	26/8/2022	0:07:30	0:00:30			31.0												
	End Test	26/8/2022	0:08:00	0:08:00		75	29.6 29.6	184	31.0 31.0	12.409	3.447E-03	10.095	2.804E-03						
17	Start Test	26/8/2022	0:08:00	0:00:30			29.6												
	End Test	26/8/2022	0:08:30	0:08:30		70	28.3 28.3	167	31.0 31.0	11.523	3.201E-03	9.178	2.549E-03						
18	Start Test	26/8/2022	0:08:30	0:00:30			28.3												
	End Test	26/8/2022	0:09:00	0:09:00		75	26.9 26.9	184	31.0 31.0	12.409	3.447E-03	10.095	2.804E-03						
19	Start Test	26/8/2022	0:09:00	0:00:30			26.9												
	End Test	26/8/2022	0:09:30	0:09:30		65	25.7 25.7	184	31.0 31.0	10.636	2.954E-03	10.095	2.804E-03						
20	Start Test	26/8/2022	0:09:30	0:00:30			25.7												
	End Test	26/8/2022	0:10:00	0:10:00		70	24.4 24.4	184	31.0 31.0	11.523	3.201E-03	10.095	2.804E-03						
21	Start Test	26/8/2022	0:10:00	0:00:30			24.4												
	End Test	26/8/2022	0:10:30	0:10:30		65	23.2 23.2	201	31.0 31.0	10.636	2.954E-03	11.013	3.059E-03						
22	Start Test	26/8/2022	0:10:30	0:00:30			23.2												
	End Test	26/8/2022	0:11:00	0:11:00		70	21.9 21.9	167	31.0 31.0	11.523	3.201E-03	9.178	2.549E-03						
23	Start Test	26/8/2022	0:11:00	0:00:30			21.9												
	End Test	26/8/2022	0:11:30	0:11:30		65	20.7 20.7	184	31.0 31.0	10.636	2.954E-03	10.095	2.804E-03						
24	Start Test	26/8/2022	0:11:30	0:00:30			20.7												
	End Test	26/8/2022	0:12:00	0:12:00		65	19.5 19.5	184	31.0 31.0	10.636	2.954E-03	10.095	2.804E-03						
25	Start Test	26/8/2022	0:12:00	0:00:30			19.5												
	End Test	26/8/2022	0:12:30	0:12:30		65	18.3 18.3	184	31.0 31.0	10.636	2.954E-03	10.095	2.804E-03						
26	Start Test	26/8/2022	0:12:30	0:00:30			18.3												
	End Test	26/8/2022	0:13:00	0:13:00		65	17.1 17.1	201	31.0 31.0	10.636	2.954E-03	11.013	3.059E-03						
27	Start Test	26/8/2022	0:13:00	0:00:30			17.1												
	End Test	26/8/2022	0:13:30	0:13:30		70	15.8 15.8	167	31.0 31.0	11.523	3.201E-03	9.178	2.549E-03						
28	Start Test	26/8/2022	0:13:30	0:00:30			15.8												
	End Test	26/8/2022	0:14:00	0:14:00		65	14.6 14.6	184	31.0 31.0	10.636	2.954E-03	10.095	2.804E-03						
29	Start Test	26/8/2022	0:14:00	0:00:30			14.6												
	End Test	26/8/2022	0:14:30	0:14:30		59	13.5 13.5	201	31.0 31.0	9.750	2.708E-03	11.013	3.059E-03						
30	Start Test	26/8/2022	0:14:30	0:00:30			13.5												
	End Test	26/8/2022	0:15:00	0:15:00		65	12.3 12.3	201	31.0 31.0	10.636	2.954E-03	11.013	3.059E-03						
31	Start Test	26/8/2022	0:15:00	0:00:30			12.3												
	End Test	26/8/2022	0:15:30	0:15:30		59	11.2 11.2</												



JULIO 2022

Sample Identification		 FIRST QUANTUM MINERALS LTD. Cobre Panamá	
1	Informacion General (Informacion General)		
	Sample number (Numero de muestra):	MPSA-RT-DRI-080	
	sampled date (Fecha de muestreo):	17-Jul-22	
2	Material Information (Informacion del Material)		
	Source (Fuente)	Sand Cycloning Plant	
	Work Area (Area de Trabajo)	TMF ED-3 CELL-36 Plataforma, Sand Dam Extension.	
	Borrow - Foundation - Excavation - Crusher - Fill - Site Investigation - Other: Plant <i>Prestamo - Fundacion - Excavacion - Crusher - Relleno - Investigacion de Sitio - Otro:</i>		
	Fill Zone (specs 1824-363-CI-SPC-0003): Zona de Material:		
	Material Type Tipo de Material	Hydraulic Sand	Quality Test
	Remarks: Comentarios:		
	Test Doble Ring, Sand Cone and Permeability		
		Start sta.:	End Sta.:
	Coordinates - GPS or Survey (Coordenadas - GPS o Topografia):	N: 981896	E: 538653
	Depth used to estimate elevation: (Profundidad a la que se tomo la muestra):	150 mm	
	Recorded Ground elevation: (Elevacion del terreno)	87.27m	
Technician:	Name: JAC / AP	Signature:	
Lab Supervisor:	Name: CG	Signature:	

MINA COBRE PANAMA
Gradation Analysis (ASTM D6913)



Sample Type:

Tailings Material

Technician:

AP

Sample No:

MPSA-RT-DRI-080

Date Tested:

17-Jul-22

Source:

Sand Cycloning Plant

17-Jul-22

Location:

TMF ED-3 CELL-36 Plataforma, Sand Dam Extension.

Other:

Test Doble Ring, Sand Cone and Permeability

Wet Weight (g):

537.63

Moisture (%):

8.5

Orig. Dry Wt. (g):

495.53

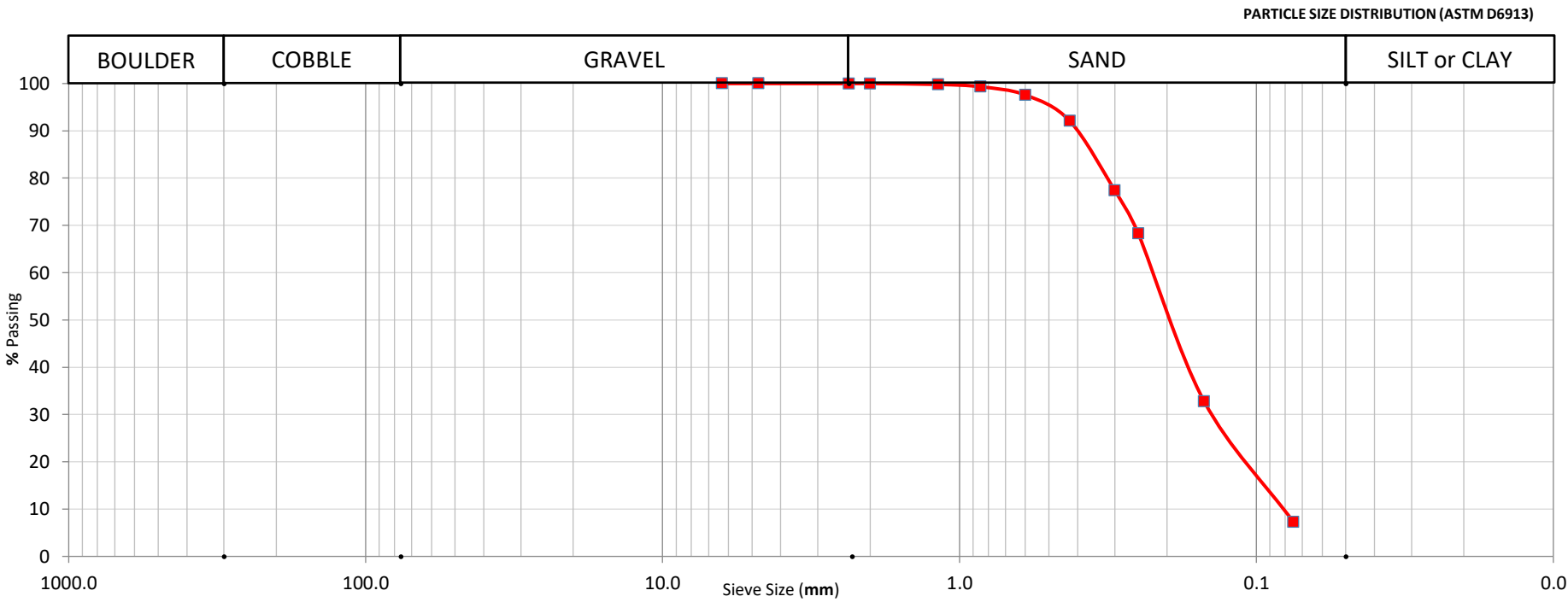
Total Solid (%):

Washed Oven Dry Wt. (g):

Washed Loss (g):

Specific Gravity :

Gravel	0.0
Sand	92.7
Fines	7.3
Fineness modulus	2.26



Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
24"	600.0						
18"	450.0						
12"	300.0						
8"	200.0						
6"	150.0						
5"	125.0						
4"	100.0						
3"	75.0						
2 1/2"	63.0						
2"	50.0						
1.5"	37.5						
1"	25.0						
3/4"	19.0						
1/2"	12.5						
3/8"	9.5						
1/4"	6.3			0.00	0.00	0.0	100.0

Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
#4	4.75			0.00	0.00	0.0	100.0
#8	2.36			0.05	0.05	0.0	100.0
#10	2.00			0.01	0.06	0.0	100.0
#16	1.18			0.90	0.96	0.2	99.8
#20	0.85			2.43	3.39	0.7	99.3
#30	0.60			8.59	11.98	2.4	97.6
#40	0.425			27.33	39.31	7.9	92.1
#50	0.30			72.83	112.14	22.6	77.4
#60	0.25			45.18	157.32	31.7	68.3
#100	0.15			175.75	333.07	67.2	32.8
#200	0.075			126.49	459.56	92.7	7.3

Project Identification:		MPSA Cobre TMF				Constants		Area cm2		Depth of Liquid (cm)	Liquid Container Number				Marriotte Tube Volume		Marriotte Tube Area	
Test Location:		TMF ED-3 CELL-36 Plataforma, Sand Dam Extension.				Inner Ring		729		15.0					3000		54	
Liquid Used:		H ₂ O	pH:	N/A		Annular Space		2189		15.0					10000		167	
Tested By:		JAC/AM				Liquid level maintained using:		() Flow Valve () Float Valve (X) Mariotte Tubes										
Fines %:		7.3				Penetration Depth of Outer Ring: 15cm												
Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/(Total) Min	Flow Readings				Liquid Temp C	Infiltration Rate				Ground Temperature		Remarks		
					Inner Ring Reading cm	Inner Marriotte Tube Flow (ml)	Annular Space Reading cm	Annular Space Marriotte Tube Flow (ml)		Inner Infiltration Rate cm/h	Inner Infiltration Rate cm/s	Annular Infiltration Rate cm/h	Annular Infiltration Rate cm/s	Ground Temp Depth (cm)	Temp at Depth (c)	Weather Conditions Etc...		
1	Start Test	07/17/22	0:00:00		57.0		57.0		28.5								Annular Ring H ₂ O Depth Initial: 15cm	
	End Test	07/17/22	0:00:30	0:00:30	50.1	372	54.7	385	28.5	61.158	1.699E-02	21.109	5.863E-03	30.0	29.5		Inner Ring H ₂ O Depth Initial: 15cm	
2	Start Test	07/17/22	0:00:30	0:00:30	50.1		54.7		28.5									
	End Test	07/17/22	0:01:00	0:01:00	45.0	275	53.5	201	28.5	45.204	1.256E-02	11.013	3.059E-03					
3	Start Test	07/17/22	0:01:00	0:00:30	45.0		53.5		28.5								Annular Ring H ₂ O Depth Final: 3.0 cm	
	End Test	07/17/22	0:01:30	0:01:30	40.0	269	52.2	218	28.5	44.317	1.231E-02	11.931	3.314E-03				Inner Ring H ₂ O Depth Final: 2.0 cm	
4	Start Test	07/17/22	0:01:30	0:00:30	40.0		52.2		28.5									
	End Test	07/17/22	0:02:00	0:02:00	35.5	242	51.0	201	28.5	39.886	1.108E-02	11.013	3.059E-03					
5	Start Test	07/17/22	0:02:00	0:00:30	35.5		51.0		28.5									
	End Test	07/17/22	0:02:30	0:02:30	30.6	264	49.6	234	28.5	43.431	1.206E-02	12.849	3.569E-03				Weather conditions: Rainy day	
6	Start Test	07/17/22	0:02:30	0:00:30	30.6		49.6		28.5									
	End Test	07/17/22	0:03:00	0:03:00	26.5	221	48.5	184	28.5	36.340	1.009E-02	10.095	2.804E-03				Weather Temp: 28.5°C	
7	Start Test	07/17/22	0:03:00	0:00:30	26.5		48.5		28.5									
	End Test	07/17/22	0:03:30	0:03:30	22.4	221	47.1	234	28.5	36.340	1.009E-02	12.849	3.569E-03					
8	Start Test	07/17/22	0:03:30	0:00:30	22.4		47.1		28.5								Nuclear Density Test	
	End Test	07/17/22	0:04:00	0:04:00	18.5	210	45.8	218	28.5	34.568	9.602E-03	11.931	3.314E-03					
9	Start Test	07/17/22	0:04:00	0:00:30	18.5		45.8		28.5								W.D: 1900 kg/m3	
	End Test	07/17/22	0:04:30	0:04:30	14.6	210	44.5	218	28.5	34.568	9.602E-03	11.931	3.314E-03					
10	Start Test	07/17/22	0:04:30	0:00:30	14.6		44.5		28.5								D.D: 1729 kg/m3	
	End Test	07/17/22	0:05:00	0:05:00	11.0	194	43.2	218	28.5	31.909	8.863E-03	11.931	3.314E-03					
11	Start Test	07/17/22	0:05:00	0:00:30	11.0		43.2		28.5								M.C: 9.8 %	
	End Test	07/17/22	0:05:30	0:05:30	7.0	215	41.9	218	28.5	35.454	9.848E-03	11.931	3.314E-03					
12	Start Test	07/17/22	0:05:30	0:00:30	7.0		41.9		28.5								Compaction: 109.1%	
	End Test	07/17/22	0:06:00	0:06:00	4.5	135	40.6	218	28.5	22.159	6.155E-03	11.931	3.314E-03					
13	Start Test	07/17/22	0:06:00	0:00:30	4.5		40.6		28.5								(Using MPSA-PD-375 Standard Lab. Compaction M.D.D: 1585, O.M.C: 18.7%) Hydraulic Sand	
	End Test	07/17/22	0:06:30	0:06:30	1.5	162	39.4	201	28.5	26.590	7.386E-03	11.013	3.059E-03					
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		

AGOSTO 2022

Sample Identification		 FIRST QUANTUM MINERALS LTD. Cobre Panamá	
	Informacion General (Informacion General)		
	Sample number (Numero de muestra):	MPSA-RT-DRI-086	
	sampled date (Fecha de muestreo):	26-Aug-22	
	Material Information (Informacion del Material)		
	Source (Fuente)	TMF Sand Cyclone Plant	
	Work Area (Area de Trabajo)	TMF ND4 Sand Cell N°28 Platform (in place).	
	Borrow - Foundation - Excavation - Crusher - Fill - Site Investigation - Other: Plant <i>Prestamo - Fundacion - Excavacion - Crusher - Relleño - Investigacion de Sitio - Otro:</i>		
	Fill Zone (specs 1824-363-CI-SPC-0003): <i>Zona de Material:</i>		
	Material Type <i>Tipo de Material</i>	Hydraulic Sand	Quality Test For DRI Infiltrometer Test
	Remarks: <i>Comentarios:</i>		
	Doble Ring Test, Sand Cone and Permeability Test		
		Start sta.:	End Sta.:
	Coordinates - GPS or Survey <i>(Coordenadas - GPS o Topografia):</i>	N: 982842	E: 535626
	Depth used to estimate elevation: <i>(Profundidad a la que se tomo la muestra):</i>	150 mm	
	Recorded Ground elevation: <i>(Elevacion del terreno)</i>	Elev. 91.27m	
Technician:	Name: AP/DS	Signature:	
Lab Supervisor:	Name: CG	Signature:	

Form No. 1824-QC-LST-057 Rv02 Dual language

Project Identification:				MPSA Cobre TMF				Constants		Area cm2		Depth of Liquid (cm)		Liquid Container Number		Marriottte Tube Volume		Marriottte Tube Area	
Test Location:				TMF ND4 Sand Cell N#28 Platform (in place).				Inner Ring		729		15.0				3000		54	
Liquid Used:				H ₂ O		pH: N/A		Annular Space		2189		15.0				10000		167	
Tested By:				Arcelio P / David S				Liquid level maintained using:		() Flow Valve () Float Valve (X) Mariotte Tubes									
Fines %:				11.4%				Penetration Depth of Outer Ring: 15cm											
Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/(Total) Min	Flow Readings				Liquid Temp C	Infiltration Rate				Ground Temperature		Remarks			
					Inner Ring Reading cm	Inner Mariotte Tube Flow (ml)	Annular Space Reading cm	Annular Space Mariotte Tube Flow (ml)		Inner Infiltration Rate cm/h	Inner Infiltration Rate cm/s	Annular Infiltration Rate cm/h	Annular Infiltration Rate cm/s	Ground Temp Depth (cm)	Temp at Depth (c)		Weather Conditions Etc...		
1	Start Test	26/8/2022	0:00:00		58.5		56.5		31.0								Annular Ring H ₂ O Depth Initial: 15cm Inner Ring H ₂ O Depth Initial: 15cm		
	End Test	26/8/2022	0:00:30	0:00:30	57.6	48	55.5	167	31.0	7.977	2.216E-03	9.178	2.549E-03	30.0	29.9				
2	Start Test	26/8/2022	0:00:30	0:00:30	57.6		55.5		31.0										
	End Test	26/8/2022	0:01:00	0:01:00	56.4	65	54.0	251	31.0	10.636	2.954E-03	13.766	3.824E-03						
3	Start Test	26/8/2022	0:01:00	0:00:30	56.4		54.0		31.0								Annular Ring H ₂ O Depth Final: 2.3cm Inner Ring H ₂ O Depth Final: 0.5cm		
	End Test	26/8/2022	0:01:30	0:01:30	55.4	54	53.4	100	31.0	8.863	2.462E-03	5.507	1.530E-03						
4	Start Test	26/8/2022	0:01:30	0:00:30	55.4		53.4		31.0										
	End Test	26/8/2022	0:02:00	0:02:00	54.7	38	52.4	167	31.0	6.204	1.723E-03	9.178	2.549E-03						
5	Start Test	26/8/2022	0:02:00	0:00:30	54.7		52.4		31.0								Weather conditions: Sunny Hot Day		
	End Test	26/8/2022	0:02:30	0:02:30	53.7	54	51.2	201	31.0	8.863	2.462E-03	11.013	3.059E-03						
6	Start Test	26/8/2022	0:02:30	0:00:30	53.7		51.2		31.0								Weather Temp: 30.0°C		
	End Test	26/8/2022	0:03:00	0:03:00	52.8	48	50.4	134	31.0	7.977	2.216E-03	7.342	2.039E-03						
7	Start Test	26/8/2022	0:03:00	0:00:30	52.8		50.4		31.0										
	End Test	26/8/2022	0:03:30	0:03:30	51.8	54	49.2	201	31.0	8.863	2.462E-03	11.013	3.059E-03						
8	Start Test	26/8/2022	0:03:30	0:00:30	51.8		49.2		31.0								Nuclear Density Test		
	End Test	26/8/2022	0:04:00	0:04:00	50.9	48	48.2	167	31.0	7.977	2.216E-03	9.178	2.549E-03						
9	Start Test	26/8/2022	0:04:00	0:00:30	50.9		48.2		31.0								W.D: 1862 kg/m3		
	End Test	26/8/2022	0:04:30	0:04:30	49.9	54	47.0	201	31.0	8.863	2.462E-03	11.013	3.059E-03						
10	Start Test	26/8/2022	0:04:30	0:00:30	49.9		47.0		31.0								D.D: 1775 kg/m3		
	End Test	26/8/2022	0:05:00	0:05:00	49.1	43	46.0	167	31.0	7.091	1.970E-03	9.178	2.549E-03						
11	Start Test	26/8/2022	0:05:00	0:00:30	49.1		46.0		31.0								M.C: 4.9%		
	End Test	26/8/2022	0:05:30	0:05:30	48.1	54	45.0	167	31.0	8.863	2.462E-03	9.178	2.549E-03						
12	Start Test	26/8/2022	0:05:30	0:00:30	48.1		45.0		31.0								Compaction: 110.1 %		
	End Test	26/8/2022	0:06:00	0:06:00	47.2	48	43.9	184	31.0	7.977	2.216E-03	10.095	2.804E-03						
13	Start Test	26/8/2022	0:06:00	0:00:30	47.2		43.9		31.0								(Using MPSA-RT-33403 Standard Lab. Compaction M.D.D: 1612 O.M.C: 17.3%) Hydraulic Sand		
	End Test	26/8/2022	0:06:30	0:06:30	46.2	54	42.8	184	31.0	8.863	2.462E-03	10.095	2.804E-03						
14	Start Test	26/8/2022	0:06:30	0:00:30	46.2		42.8		31.0										
	End Test	26/8/2022	0:07:00	0:07:00	45.2	54	41.6	201	31.0	8.863	2.462E-03	11.013	3.059E-03						
15	Start Test	26/8/2022	0:07:00	0:00:30	45.2		41.6		31.0										
	End Test	26/8/2022	0:07:30	0:07:30	44.1	59	40.5	184	31.0	9.750	2.708E-03	10.095	2.804E-03						
16	Start Test	26/8/2022	0:07:30	0:00:30	44.1		40.5		31.0										
	End Test	26/8/2022	0:08:00	0:08:00	43.3	43	39.5	167	31.0	7.091	1.970E-03	9.178	2.549E-03						
17	Start Test	26/8/2022	0:08:00	0:00:30	43.3		39.5		31.0										
	End Test	26/8/2022	0:08:30	0:08:30	42.4	48	38.5	167	31.0	7.977	2.216E-03	9.178	2.549E-03						
18	Start Test	26/8/2022	0:08:30	0:00:30	42.4		38.5		31.0										
	End Test	26/8/2022	0:09:00	0:09:00	41.3	59	37.2	218	31.0	9.750	2.708E-03	11.931	3.314E-03						
19	Start Test	26/8/2022	0:09:00	0:00:30	41.3		37.2		31.0										
	End Test	26/8/2022	0:09:30	0:09:30	40.4	48	36.1	184	31.0	7.977	2.216E-03	10.095	2.804E-03						
20	Start Test	26/8/2022	0:09:30	0:00:30	40.4		36.1		31.0										
	End Test	26/8/2022	0:10:00	0:10:00	39.4	54	35.1	167	31.0	8.863	2.462E-03	9.178	2.549E-03						
21	Start Test	26/8/2022	0:10:00	0:00:30	39.4		35.1		31.0										
	End Test	26/8/2022	0:10:30	0:10:30	38.4	54	34.0	184	31.0	8.863	2.462E-03	10.095	2.804E-03						
22	Start Test	26/8/2022	0:10:30	0:00:30	38.4		34.0		31.0										
	End Test	26/8/2022	0:11:00	0:11:00	37.5	48	33.0	167	31.0	7.977	2.216E-03	9.178	2.549E-03						
23	Start Test	26/8/2022	0:11:00	0:00:30	37.5		33.0		31.0										
	End Test	26/8/2022	0:11:30	0:11:30	36.5	54	31.6	234	31.0	8.863	2.462E-03	12.849	3.569E-03						
24	Start Test	26/8/2022	0:11:30	0:00:30	36.5		31.6		31.0										
	End Test	26/8/2022	0:12:00	0:12:00	35.6	48	30.5	184	31.0	7.977	2.216E-03	10.095	2.804E-03						
25	Start Test	26/8/2022	0:12:00	0:00:30	35.6		30.5		31.0										
	End Test	26/8/2022	0:12:30	0:12:30	34.5	59	29.5	167	31.0	9.750	2.708E-03	9.178	2.549E-03						
26	Start Test	26/8/2022	0:12:30	0:00:30	34.5		29.5		31.0										
	End Test	26/8/2022	0:13:00	0:13:00	33.6	48	28.2	218	31.0	7.977	2.216E-03	11.931	3.314E-03						
27	Start Test	26/8/2022	0:13:00	0:00:30	33.6		28.2		31.0										
	End Test	26/8/2022	0:13:30	0:13:30	32.6	54	27.0	201	31.0	8.863	2.462E-03	11.013	3.059E-03						
28	Start Test	26/8/2022	0:13:30	0:00:30	32.6		27.0		31.0										
	End Test	26/8/2022	0:14:00	0:14:00	31.6	54	25.9	184	31.0	8.863	2.462E-03	10.095	2.804E-03						
29	Start Test	26/8/2022	0:14:00	0:00:30	31.6		25.9		31.0										
	End Test	26/8/2022	0:14:30	0:14:30	30.6	54	24.6	218	31.0	8.863	2.462E-03	11.931	3.314E-03						
30	Start Test	26/8/2022	0:14:30	0:00:30	30.6		24.6		31.0										
	End Test	26/8/2022	0:15:00	0:15:00	29.5	59	23.5	184	31.0	9.750	2.708E-03	10.095	2.804E-03						
31	Start Test	26/8/2022	0:15:00	0:00:30	29.5		23.5		31.0										
	End Test	26/8/2022	0:15:30	0:15:30	28.6	48	22.4	184	31.0	7.977	2.216E-03	10.095	2.804E-03						
32	Start Test	26/8/2022	0:15:30	0:00:30	28.6		22.4		31.0										
	End Test	26/8/2022	0:16:00	0:16:00	27.6	54	21.2	201	31.0	8.863	2.462E-03	11.013	3.059E-03						
33	Start Test	26/8/2022	0:16:00	0:00:30	27.6		21.2		31.0										



SEPTIEMBRE 2022

Sample Identification		 FIRST QUANTUM MINERALS LTD. Cobre Panamá	
	Informacion General (Informacion General)		
	Sample number (Numero de muestra):	MPSA-RT-DRI-092	
	sampled date (Fecha de muestreo):	27-Sep-22	
	Material Information (Informacion del Material)		
	Source (Fuente)	TMF Sand Cyclone Plant	
	Work Area (Area de Trabajo)	TMF ED-1 Sand Cell N°42 Dam Extension (in place).	
	Borrow - Foundation - Excavation - Crusher - Fill - Site Investigation - Other: Plant <i>Prestamo - Fundacion - Excavacion - Crusher - Relleno - Investigacion de Sitio - Otro:</i>		
	Fill Zone (specs 1824-363-CI-SPC-0003): <i>Zona de Material:</i>		
	Material Type <i>Tipo de Material</i>	Cyclone Sand	Quality Test
	Remarks: <i>Comentarios:</i>		
	Test Doble Ring, Sand Cone and Permeability		
		Start sta.:	End Sta.:
	Coordinates - GPS or Survey <i>(Coordenadas - GPS o Topografia):</i>	N: 982516	E: 538676
	Depth used to estimate elevation: <i>(Profundidad a la que se tomo la muestra):</i>	150 mm	
	Recorded Ground elevation: <i>(Elevacion del terreno)</i>	Elev. 95.52m	
Technician:	Name: MG / EL	Signature:	
Lab Supervisor:	Name: CG	Signature:	

MINA COBRE PANAMA
Gradation Analysis (ASTM D6913)



FIRST QUANTUM
MINERALS LTD.

Cobre Panamá

Sample Type: Tailings Material

Technician: EG

Location: TMF ED-1 Sand Cell N°42 Dam
Extension (in place).

Sample No: MPSA-RT-DRI-092

Date Tested: 28-Sep-22

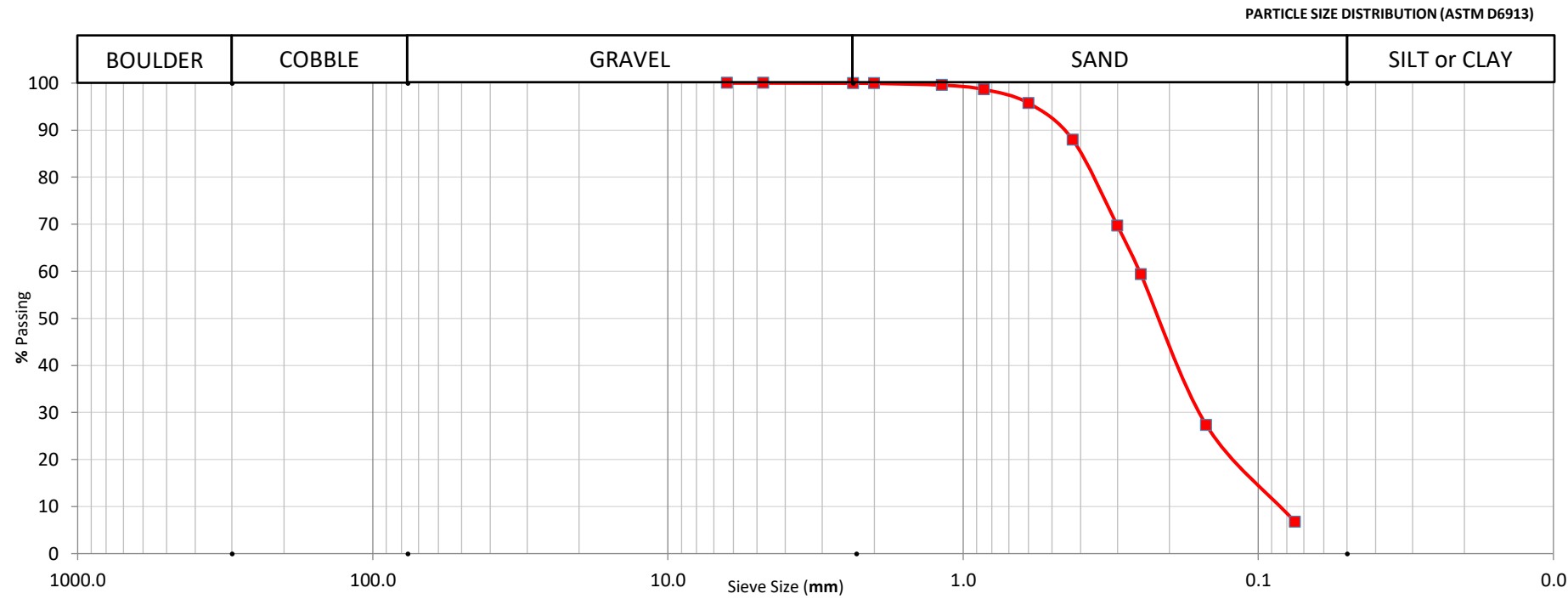
Other: Test Doble Ring, Sand Cone and
Permeability

Source: TMF Sand Cyclone Plant

27-Sep-22

Wet Weight (g):	543.32
Moisture (%):	8.4
Orig. Dry Wt. (g):	501.39
Total Solid (%):	
Washed Oven Dry Wt. (g):	467.69
Washed Loss (g):	33.70
Specific Gravity :	

Gravel	0.0
Sand	93.3
Fines	6.7
Fineness modulus	2.55



Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
24"	600.0						
18"	450.0						
12"	300.0						
8"	200.0						
6"	150.0						
5"	125.0						
4"	100.0						
3"	75.0						
2 1/2"	63.0						
2"	50.0						
1.5"	37.5						
1"	25.0						
3/4"	19.0						
1/2"	12.5						
3/8"	9.5						
1/4"	6.3			0.00	0.00	0.0	100.0

Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
#4	4.75			0.00	0.00	0.0	100.0
#8	2.36			0.15	0.15	0.0	100.0
#10	2.00			0.20	0.35	0.1	99.9
#16	1.18			1.81	2.16	0.4	99.6
#20	0.85			4.61	6.77	1.4	98.6
#30	0.60			14.60	21.37	4.3	95.7
#40	0.425			39.12	60.49	12.1	87.9
#50	0.30			91.61	152.10	30.3	69.7
#60	0.25			51.62	203.72	40.6	59.4
#100	0.15			160.66	364.38	72.7	27.3
#200	0.075			103.31	467.69	93.3	6.7

MINA COBRE PANAMA
Gradation Analysis (ASTM D6913)



FIRST QUANTUM
MINERALS LTD.

Cobre Panamá

Sample Type: Hydraulic Sand

Technician: JS/CHF

Location: TMF ND4 Sand Cell N°28 Platform (in place).

Sample No: MPSA-RT-DRI-086

Date Tested: 26-Aug-22

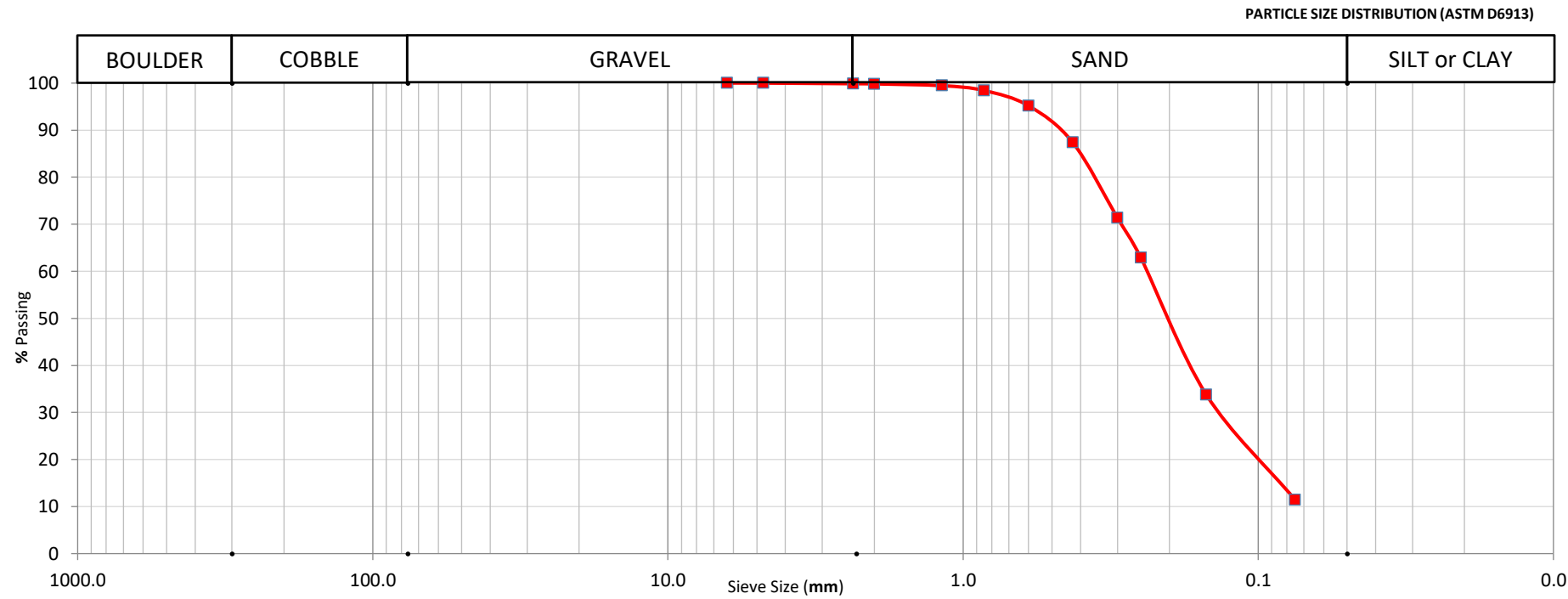
Other: Doble Ring Test, Sand Cone and Permeability Test

Source: TMF Sand Cyclone Plant

26-Aug-22

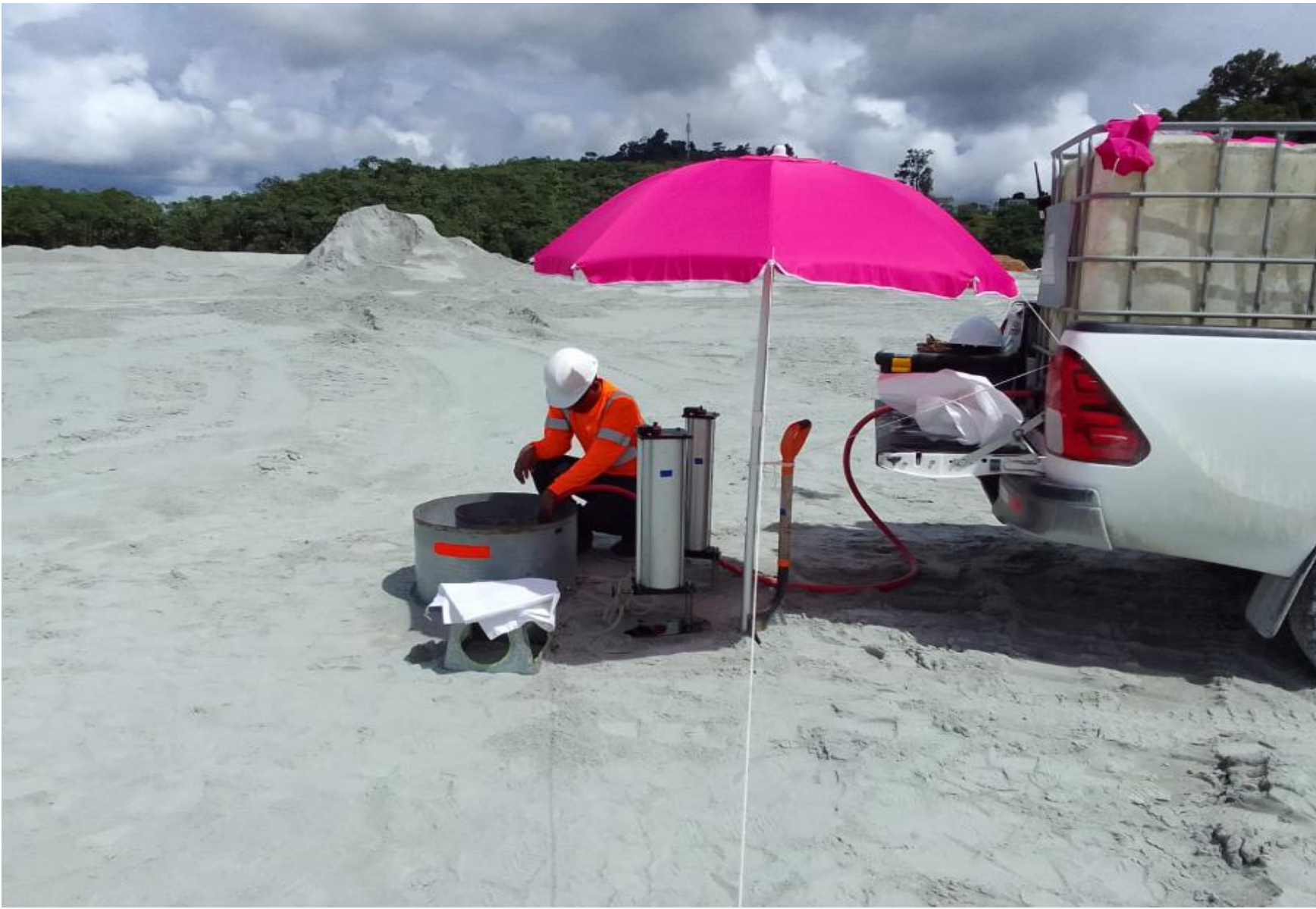
Wet Weight (g):	583.66
Moisture (%):	7.0
Orig. Dry Wt. (g):	545.46
Total Solid (%):	
Washed Oven Dry Wt. (g):	483.03
Washed Loss (g):	62.43
Specific Gravity :	

Gravel	0.0
Sand	88.6
Fines	11.4
Fineness modulus	2.40



Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
24"	600.0						
18"	450.0						
12"	300.0						
8"	200.0						
6"	150.0						
5"	125.0						
4"	100.0						
3"	75.0						
2 1/2"	63.0						
2"	50.0						
1.5"	37.5						
1"	25.0						
3/4"	19.0						
1/2"	12.5						
3/8"	9.5						
1/4"	6.3			0.00	0.00	0.0	100.0

Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
#4	4.75			0.00	0.00	0.0	100.0
#8	2.36			0.73	0.73	0.1	99.9
#10	2.00			0.22	0.95	0.2	99.8
#16	1.18			2.02	2.97	0.5	99.5
#20	0.85			5.58	8.55	1.6	98.4
#30	0.60			17.72	26.27	4.8	95.2
#40	0.425			42.63	68.90	12.6	87.4
#50	0.30			87.33	156.23	28.6	71.4
#60	0.25			46.22	202.45	37.1	62.9
#100	0.15			158.74	361.19	66.2	33.8
#200	0.075			121.84	483.03	88.6	11.4





OCTUBRE 2022

Sample Identification		 FIRST QUANTUM MINERALS LTD. Cobre Panamá	
	Informacion General (Informacion General)		
	Sample number (Numero de muestra):	MPSA-RT-DRI-094	
	sampled date (Fecha de muestreo):	10-Oct-22	
	Material Information (Informacion del Material)		
	Source (Fuente)	TMF Sand Cyclone Plant	
	Work Area (Area de Trabajo)	TMF ED3 (E7) Sand Cell N°27 Platform (in place).	
	Borrow - Foundation - Excavation - Crusher - Fill - Site Investigation - Other: Plant <i>Prestamo - Fundacion - Excavacion - Crusher - Relleno - Investigacion de Sitio - Otro:</i>		
	Fill Zone (specs 1824-363-CI-SPC-0003): <i>Zona de Material:</i>		
	Material Type <i>Tipo de Material</i>	Cyclone Sand (Hydraulic)	Quality Test
	Remarks: <i>Comentarios:</i>		
	Doble Ring Infiltration Test, Sand Cone and Permeability Test		
		Start sta.:	End Sta.:
	Coordinates - GPS or Survey <i>(Coordenadas - GPS o Topografia):</i>	N: 981029	E: 538791
	Depth used to estimate elevation: <i>(Profundidad a la que se tomo la muestra):</i>	150 mm	
	Recorded Ground elevation: <i>(Elevacion del terreno)</i>	Elev- 85.57 m	
Technician:	Name: Arcelio P. / Feliciano M.		Signature:
Lab Supervisor:	Name: CG		Signature:

MINA COBRE PANAMA
Gradation Analysis (ASTM D6913)



FIRST QUANTUM
MINERALS LTD.

Cobre Panamá

Sample Type: Tailings Material

Technician: AP/BZ/FM

Location: TMF ED3 (E7) Sand Cell N°27 Platform (in place).

Sample No: MPSA-RT-DRI-094

Date Tested: 11-Oct-22

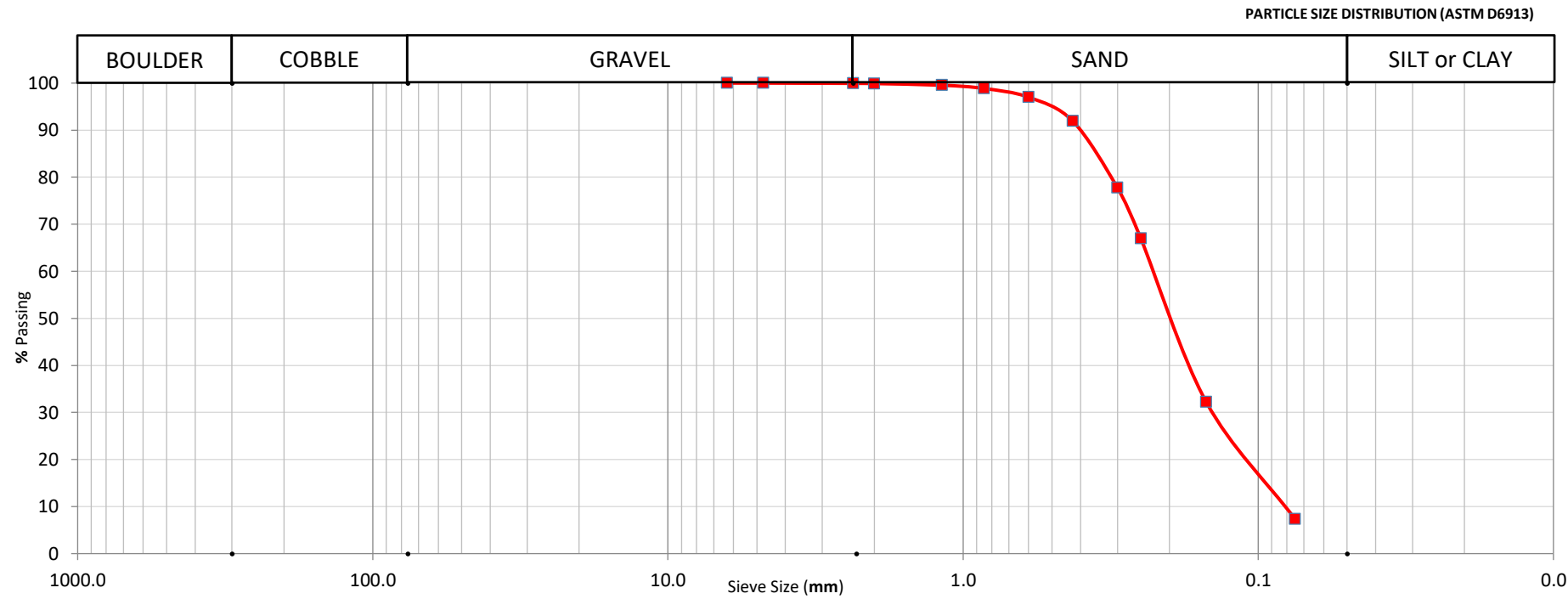
Other: Doble Ring Infiltration Test, Sand Cone and Permeability Test

Source: TMF Sand Cyclone Plant

10-Oct-22

Wet Weight (g):	537.00
Moisture (%):	8.6
Orig. Dry Wt. (g):	494.32
Total Solid (%):	
Washed Oven Dry Wt. (g):	458.10
Washed Loss (g):	36.22
Specific Gravity :	

Gravel	0.0
Sand	92.7
Fines	7.3
Fineness modulus	2.29



Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
24"	600.0						
18"	450.0						
12"	300.0						
8"	200.0						
6"	150.0						
5"	125.0						
4"	100.0						
3"	75.0						
2 1/2"	63.0						
2"	50.0						
1.5"	37.5						
1"	25.0						
3/4"	19.0						
1/2"	12.5						
3/8"	9.5						
1/4"	6.3			0.00	0.00	0.0	100.0

Sieve No	Sieve Size (mm)	Coarser Limit	Finer Limit	Ind. Ret. Wt. (g)	Cum. Ret. Wt. (g)	% Retained	% Passing
#4	4.75			0.00	0.00	0.0	100.0
#8	2.36			0.28	0.28	0.1	99.9
#10	2.00			0.21	0.49	0.1	99.9
#16	1.18			1.75	2.24	0.5	99.5
#20	0.85			3.39	5.63	1.1	98.9
#30	0.60			9.17	14.80	3.0	97.0
#40	0.425			25.14	39.94	8.1	91.9
#50	0.30			70.03	109.97	22.2	77.8
#60	0.25			53.26	163.23	33.0	67.0
#100	0.15			171.96	335.19	67.8	32.2
#200	0.075			122.91	458.10	92.7	7.3

Project Identification:		MPSA Cobre TMF				Constants	Area cm2	Depth of Liquid (cm)	Liquid Container Number		Marriotte Tube Volume			Marriotte Tube Area		
Test Location:		TMF ED3 (E7) Sand Cell N°27 Platform (in place).				Inner Ring	729	15.0				3000		54		
Liquid Used:		H ₂ O	pH:	N/A		Annular Space	2189	15.0				10000		167		
Tested By:		A. Perez / F. Miranda				Liquid level maintained using:			() Flow Valve () Float Valve (X) Mariotte Tubes							
Fines %:		7.3				Penetration Depth of Outer Ring: 15cm										
Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/(Total) Min	Flow Readings				Liquid Temp C	Infiltration Rate				Ground Temperature		Remarks
					Inner Ring Reading cm	Inner Mariotte Tube Flow (ml)	Annular Space Reading cm	Annular Space Mariotte Tube Flow (ml)		Inner Infiltration Rate cm/h	Inner Infiltration Rate cm/s	Annular Infiltration Rate cm/h	Annular Infiltration Rate cm/s	Ground Temp Depth (cm)	Temp at Depth (c)	Weather Conditions Etc...
	Start Test	10/01//2022	0:00:00		58.0		57.5		31.8							Annular Ring H ₂ O Depth Initial: 15cm
1	End Test	10/01//2022	0:00:30	0:00:30	55.5	135	56.5	167	31.8	22.159	6.155E-03	9.178	2.549E-03	32.0	30.0	Inner Ring H ₂ O Depth Initial: 15cm
	Start Test	10/01//2022	0:00:30	0:00:30	55.5		56.5		31.8							
2	End Test	10/01//2022	0:01:00	0:01:00	53.4	113	55.5	167	31.8	18.613	5.170E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:01:00	0:00:30	53.4		55.5		31.8							Annular Ring H ₂ O Depth Final: 15cm
3	End Test	10/01//2022	0:01:30	0:01:30	51.4	108	54.5	167	31.8	17.727	4.924E-03	9.178	2.549E-03			Inner Ring H ₂ O Depth Final: 15cm
	Start Test	10/01//2022	0:01:30	0:00:30	51.4		54.5		31.8							
4	End Test	10/01//2022	0:02:00	0:02:00	49.4	108	53.5	167	31.8	17.727	4.924E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:02:00	0:00:30	49.4		53.5		31.8							
5	End Test	10/01//2022	0:02:30	0:02:30	47.2	118	52.6	151	31.8	19.500	5.417E-03	8.260	2.294E-03			Weather conditions: Sunny hot day
	Start Test	10/01//2022	0:02:30	0:00:30	47.2		52.6		31.8							
6	End Test	10/01//2022	0:03:00	0:03:00	45.3	102	51.7	151	31.8	16.841	4.678E-03	8.260	2.294E-03			Weather Temp: 30.3 °C
	Start Test	10/01//2022	0:03:00	0:00:30	45.3		51.7		31.8							
7	End Test	10/01//2022	0:03:30	0:03:30	43.3	108	50.8	151	31.8	17.727	4.924E-03	8.260	2.294E-03			
	Start Test	10/01//2022	0:03:30	0:00:30	43.3		50.8		31.8							Nuclear Density Test
8	End Test	10/01//2022	0:04:00	0:04:00	41.1	118	49.9	151	31.8	19.500	5.417E-03	8.260	2.294E-03			
	Start Test	10/01//2022	0:04:00	0:00:30	41.1		49.9		31.8							W.D: 1840 kg/m3
9	End Test	10/01//2022	0:04:30	0:04:30	39.5	86	48.8	184	31.8	14.182	3.939E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:04:30	0:00:30	39.5		48.8		31.8							D.D: 1708 kg/m3
10	End Test	10/01//2022	0:05:00	0:05:00	37.6	102	47.8	167	31.8	16.841	4.678E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:05:00	0:00:30	37.6		47.8		31.8							M.C: 7.7 %
11	End Test	10/01//2022	0:05:30	0:05:30	35.8	97	46.8	167	31.8	15.954	4.432E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:05:30	0:00:30	35.8		46.8		31.8							Compaction: 110.7 %
12	End Test	10/01//2022	0:06:00	0:06:00	34.0	97	45.7	184	31.8	15.954	4.432E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:06:00	0:00:30	34.0		45.7		31.8							(Using MPSA-RT-35357 Standard Lab. Compaction M.D.D: 1543, O.M.C: 20.6 Hydraulic Sand
13	End Test	10/01//2022	0:06:30	0:06:30	32.2	97	44.6	184	31.8	15.954	4.432E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:06:30	0:00:30	32.2		44.6		31.8							
14	End Test	10/01//2022	0:07:00	0:07:00	30.5	92	43.6	167	31.8	15.068	4.186E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:07:00	0:00:30	30.5		43.6		31.8							
15	End Test	10/01//2022	0:07:30	0:07:30	28.8	92	42.6	167	31.8	15.068	4.186E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:07:30	0:00:30	28.8		42.6		31.8							
16	End Test	10/01//2022	0:08:00	0:08:00	27.0	97	41.5	184	31.8	15.954	4.432E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:08:00	0:00:30	27.0		41.5		31.8							
	End Test	10/01//2022	0:08:30	0:08:30	25.4	86	40.5	167	31.8	14.182	3.939E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:08:30	0:00:30	25.4		40.5		31.8							
	End Test	10/01//2022	0:09:00	0:09:00	23.6	97	39.5	167	31.8	15.954	4.432E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:09:00	0:00:30	23.6		39.5		31.8							
	End Test	10/01//2022	0:09:30	0:09:30	22.0	86	38.2	218	31.8	14.182	3.939E-03	11.931	3.314E-03			
	Start Test	10/01//2022	0:09:30	0:00:30	22.0		38.2		31.8							
	End Test	10/01//2022	0:10:00	0:10:00	20.2	97	37.1	184	31.8	15.954	4.432E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:10:00	0:00:30	20.2		37.1		31.8							
	End Test	10/01//2022	0:10:30	0:10:30	18.4	97	36.0	184	31.8	15.954	4.432E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:10:30	0:00:30	18.4		36.0		31.8							
	End Test	10/01//2022	0:11:00	0:11:00	16.7	92	35.6	67	31.8	15.068	4.186E-03	3.671	1.020E-03			
	Start Test	10/01//2022	0:11:00	0:00:30	16.7		35.6		31.8							
	End Test	10/01//2022	0:11:30	0:11:30	15.2	81	33.5	352	31.8	13.295	3.693E-03	19.273	5.354E-03			
	Start Test	10/01//2022	0:11:30	0:00:30	15.2		33.5		31.8							
	End Test	10/01//2022	0:12:00	0:12:00	13.3	102	32.5	167	31.8	16.841	4.678E-03	9.178	2.549E-03			
	Start Test	10/01//2022	0:12:00	0:00:30	13.3		32.5		31.8							
	End Test	10/01//2022	0:12:30	0:12:30	11.6	92	31.4	184	31.8	15.068	4.186E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:12:30	0:00:30	11.6		31.4		31.8							
	End Test	10/01//2022	0:13:00	0:13:00	10.0	86	30.1	218	31.8	14.182	3.939E-03	11.931	3.314E-03			
	Start Test	10/01//2022	0:13:00	0:00:30	10.0		30.1		31.8							
	End Test	10/01//2022	0:13:30	0:13:30	8.5	81	29.0	184	31.8	13.295	3.693E-03	10.095	2.804E-03			
	Start Test	10/01//2022	0:13:30	0:00:30	8.5		29.0		31.8							
	End Test	10/01//2022	0:14:00	0:14:00	6.6	102	27.7	218	31.8	16.841	4.678E-03	11.931	3.314E-03			
	Start Test	10/01//2022	0:14:00	0:00:30	6.6		27.7		31.8							
	End Test	10/01//2022	0:14:30	0:14:30	5.0	86	26.5	201	31.8	14.182	3.939E-03	11.013	3.059E-03			
	Start Test	10/01//2022	0:14:30	0:00:30	5.0		26.5		31.8							
	End Test	10/01//2022	0:15:00	0:15:00	3.5	81	25.2	218	31.8	13.295	3.693E-03	11.931	3.314E-03			
	Start Test	10/01//2022	0:15:00	0:00:30	3.5		25.2		31.8							
	End Test	10/01//2022	0:15:30	0:15:30	1.8	92	24.1	184	31.8	15.068	4.186E-03	10.095	2.804E-03			



178° S
Donoso
Provincia de Colón
Altitud:125.3m
Velocidad:0.8km/h
10/10/2022 9:34:54 a. m.



187° S
Donoso
Provincia de Colón
Altitud: 88.4m
Velocidad: 0.0km/h
10/10/2022 10:49:18 a. m.